

Attracting Tomorrow



CeraCharge™

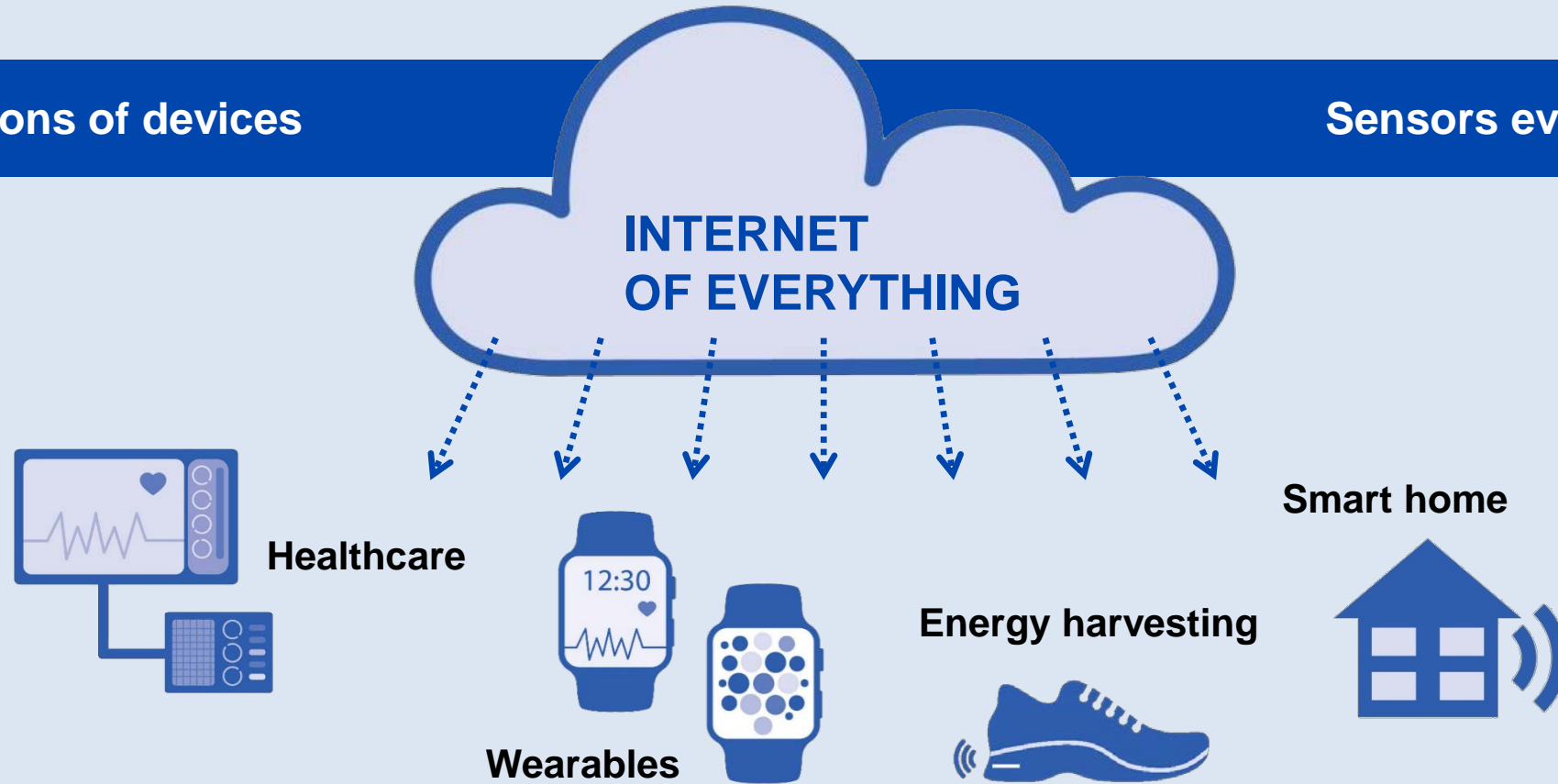
World's first rechargeable
solid-state SMD battery



Demand for a new battery technology

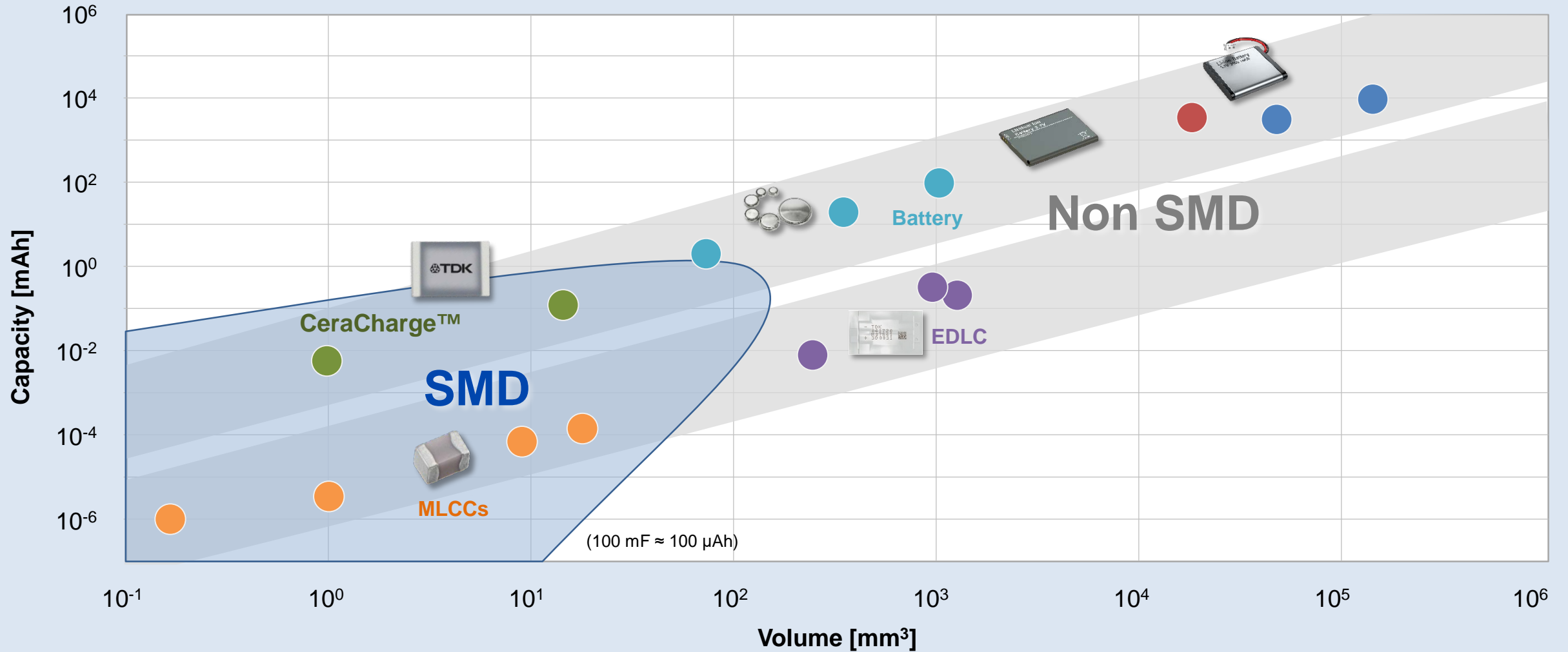
Billions of devices

Sensors everywhere

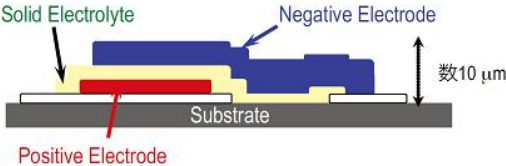
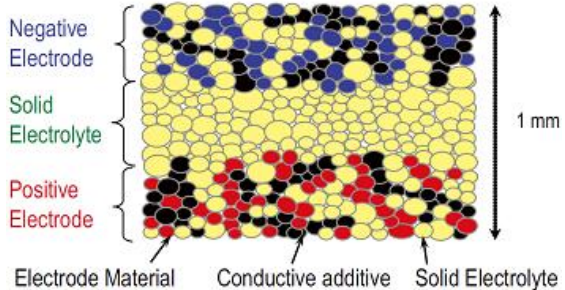
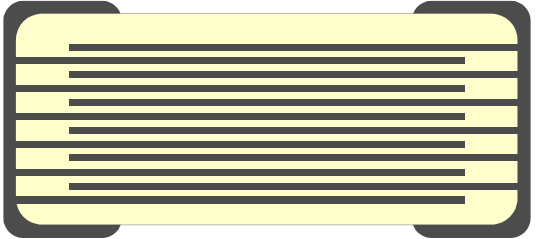


New application fields drive the demand for compact, safe, rechargeable energy sources

Comparison of energy storage devices



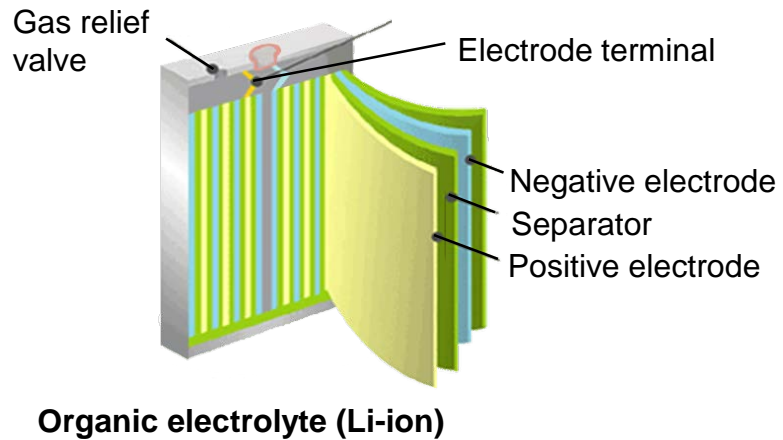
Comparison of solid-state battery technologies

| | Thin-film | Bulk (pouch cell) | Ceramic multilayer |
|---------------------------|--|---|---|
| Structure |  |  |  |
| Thickness | 0.2 mm to ~1 mm | >1 mm | 0.2 mm to ~5 mm |
| Smallest footprint | 4 mm ² | >100 mm ² | 0.5 mm ² |
| Process cost | High | Medium | Low |
| Limitations | Transport restrictions for Li metal (flights) | Must be waterproofed to prevent generation of H ₂ S | None |

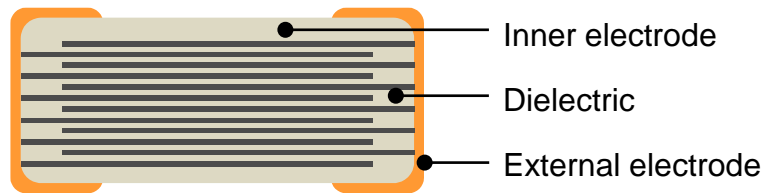
Ceramic multilayer technology offers the cost-optimized, high volume manufacture of safe batteries for IoT devices

Introducing CeraCharge™ – the world's first solid-state, SMT-compatible Li-ion battery

Li-ion battery



Multilayer ceramic



High-energy Li-ion battery technology

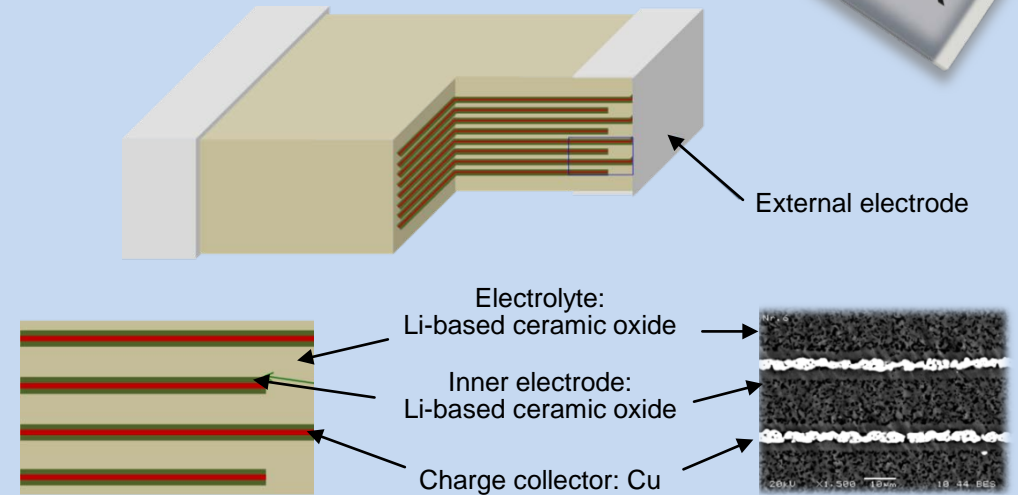
High-volume production process

CeraCharge™

All solid state

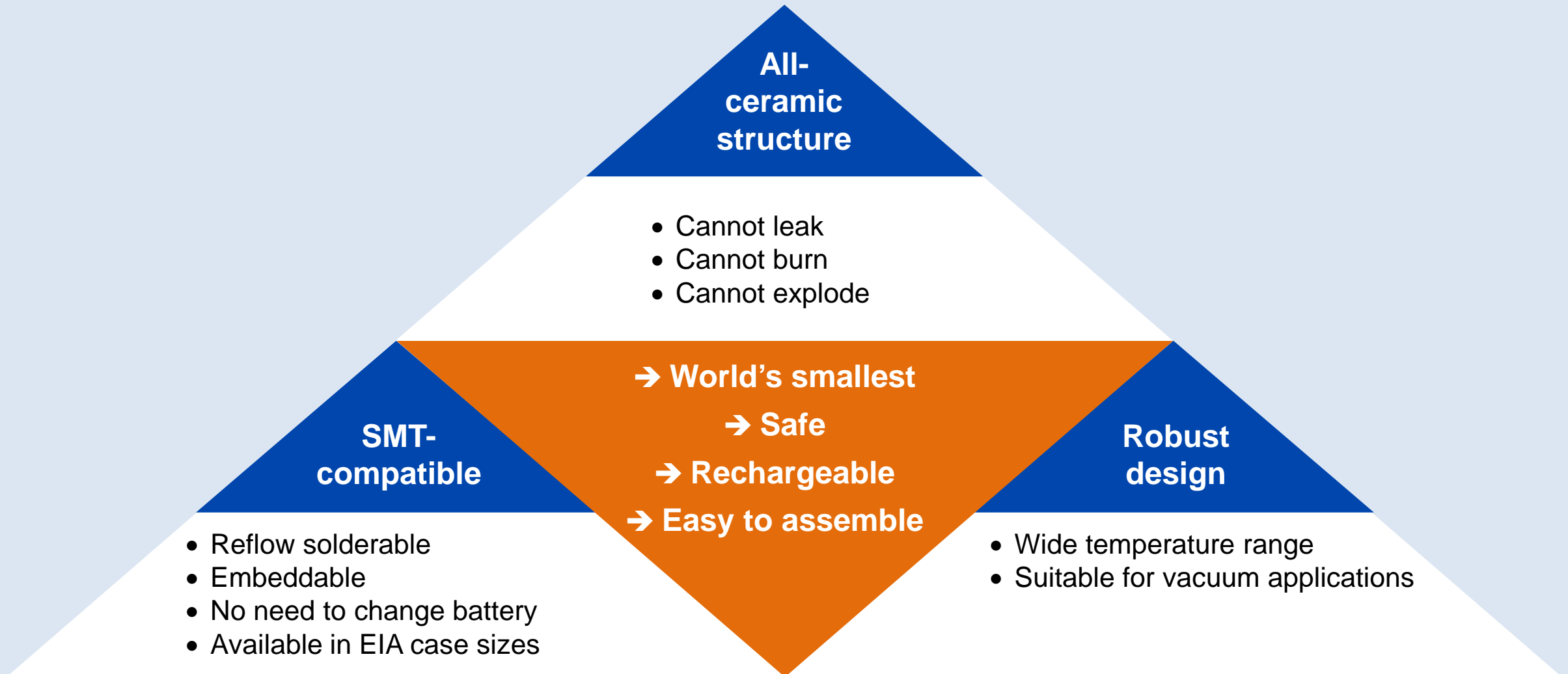
All-ceramic multilayer battery

- High safety
- SMT-compatible
- Suitable for reflow soldering



CeraCharge combines the advantages of Li-ion batteries with the safety and manufacturing benefits of ceramic multilayer components

Unique features of CeraCharge



CeraCharge – World's first rechargeable solid-state SMD battery

CeraCharge 1812

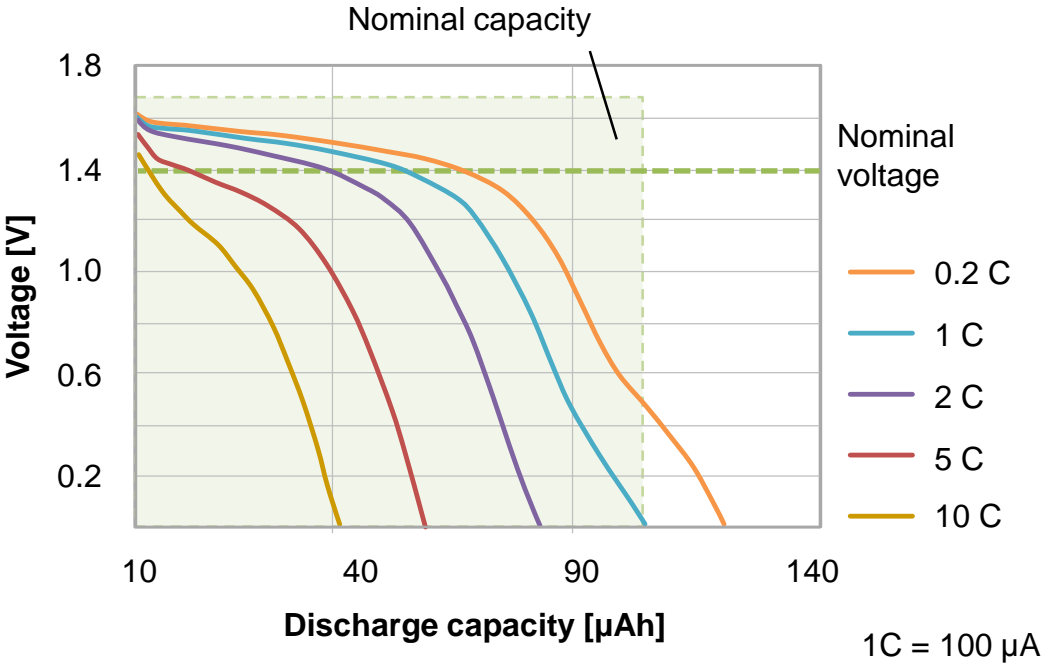
| | | |
|---------------------------|--------------------|-----------------|
| Nominal voltage | [V] | 1.5 |
| Operating voltage | [V _{op}] | 0 to 1.6 |
| Nominal capacity | [μAh] | 100 |
| Nominal discharge current | [μA] | 20 |
| Operating temperature | [°C] | -20 to +80 |
| Case size | [EIA] | 1812 |
| Dimensions | [mm] | 4.4 x 3.0 x 1.1 |
| Weight | [g] | 0.04 |



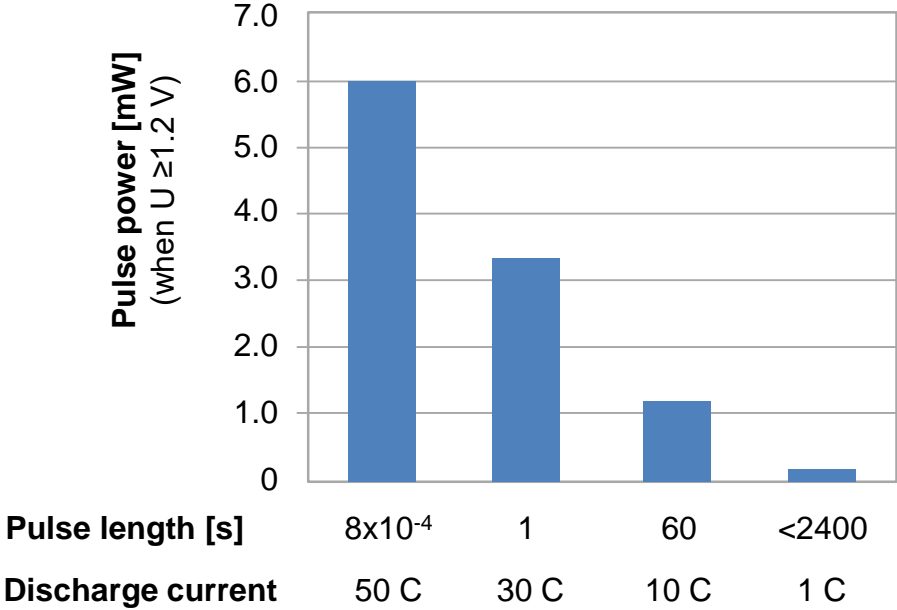
CeraCharge offers 1000 times the capacity of a capacitor in the same case size

CeraCharge features fast and pulsed discharging

Typical discharge curves



Typical pulse power

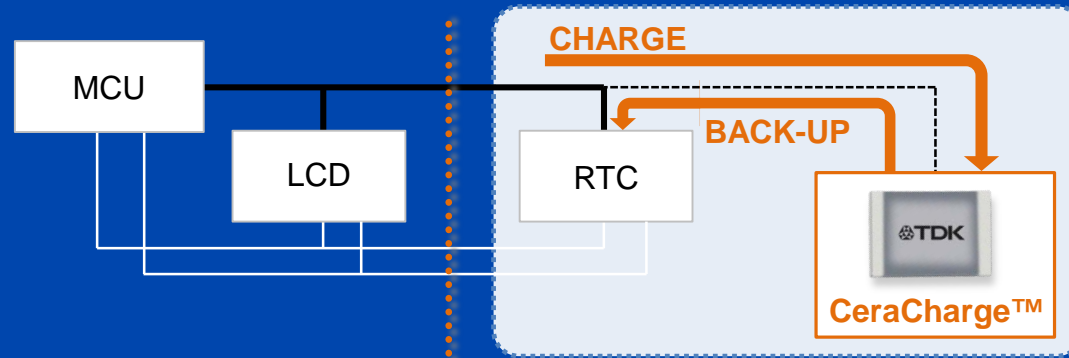


Can be connected in both series and parallel for maximum design flexibility

Main applications for CeraCharge

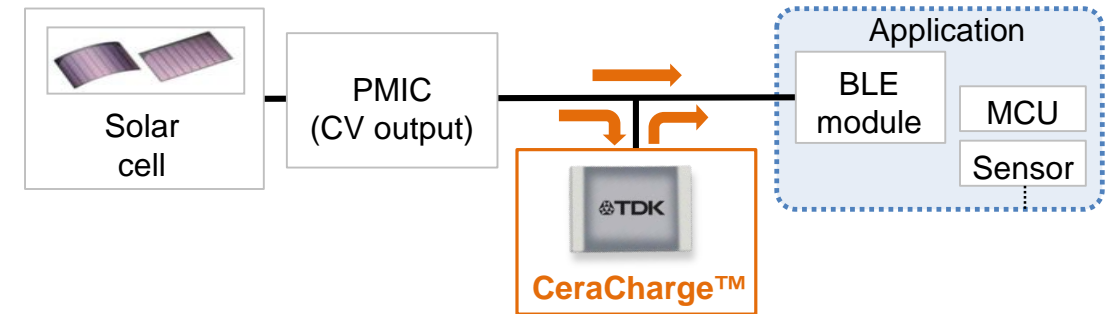
Real-time clock

Backup battery



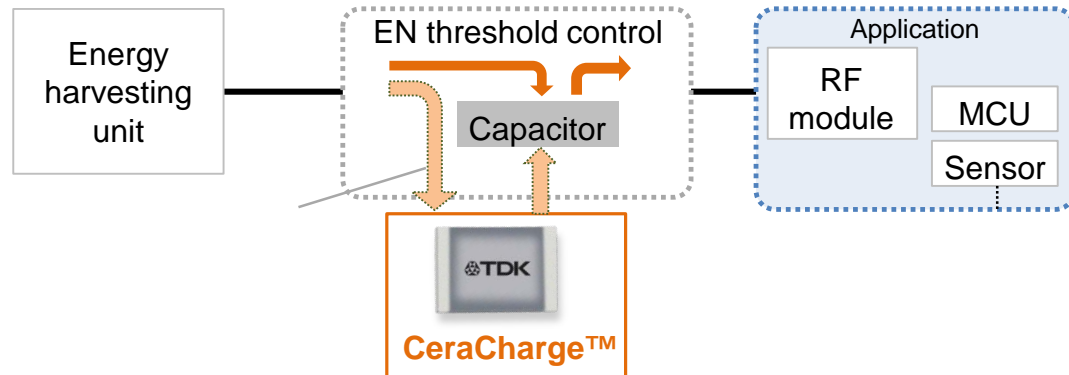
Internet of Things: Beacon

Energy storage (battery)



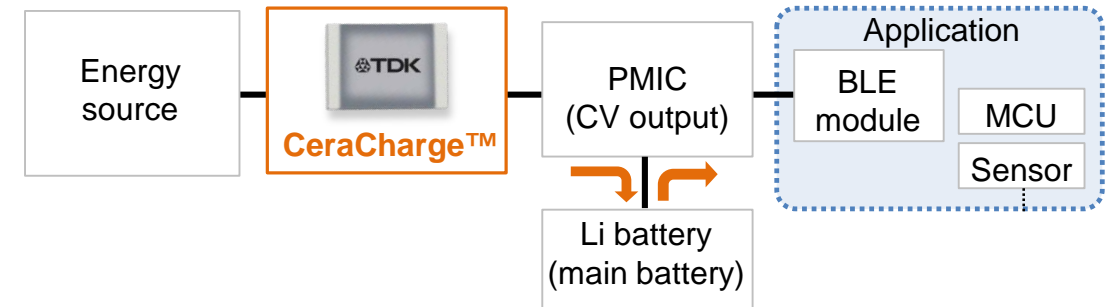
Energy harvesting

Energy storage



Wearables

Sub-battery for voltage and current smoothing





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